Notes and New Species of *Moraea* (Iridaceae: Iridoideae) from the Southern African Winter-Rainfall Zone

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ABSTRACT. *Moraea cantharophila* and *M. lilacina* are new species of the African genus *Moraea* (ca. 195 species), of subfamily Iridoideae of the Iridaceae. Both species belong to *Moraea* subg. *Vieusseuxia*, which comprises 35 species restricted to southern Africa and is centered in the southern African winter-rainfall zone. *Moraea cantharophila*, from southwestern Western Cape Province, has unusual flowers for the subgenus with entire relatively large inner tepals with a broad dark median streak on the claw. It is distinguished from its closest relative, the fly-pollinated *M. lurida*, by the shallower floral cup and unscented nectarless flowers. *Moraea lilacina*, from the northern Langeberg foothills in the Little Karoo of southeastern Western Cape Province, can be distinguished from the related *M. unguiculata* by its relatively large flower, pink pigmentation, trilobed inner tepals with a long, erect central cusp, and often densely hairy filament column. Nomenclatural adjustments include the reduction of *M. neopavonia* in *M. tulbaghensis* and the provision of a new name for the homonym *M. flexuosa* Goldblatt. Newly discovered populations of *M. saxicola* and *M. rivulicola* increase their known geographical ranges and require some adjustment to their delimitation.

Key words: beetle pollination, Iridaceae, Iridoideae, *Moraea*, *Moraea* subg. *Vieusseuxia*.

Moraea Miller, now comprising some 195 species (Goldblatt, 1998; Goldblatt & Manning, 2000a), is the largest African genus of tribe Irideae of the Iridoideae, one of four subfamilies of the Iridaceae currently recognized (Goldblatt, 1990, 2001). *Moraea*, including *Barnardiella*, *Galaxia*, *Gynandriris*, *Hexaglottis*, *Homeria*, and *Roggeveldia*, occurs widely across sub-Saharan Africa and has two species in the Mediterranean–Middle East; it is now defined by bifacial, channeled to flat leaves and a unique type of cormous rootstock consisting of a single enlarged internode that is derived entirely from an axillary bud (Goldblatt, 1976b, 1990). The genus is currently divided into five subgenera (Goldblatt, 1986). *Moraea* subg. *Vieusseuxia*, to which the new species belong, is restricted to southern Africa, south of the Limpopo–Cunene axis, and is centered in the winter-rainfall zone in the southwest of the subcontinent. Including the new species described here and the synonymous reduction of *M. neopavonia* R. C. Foster in *M. tulbaghensis* L. Bolus, *Moraea* subg. *Vieusseuxia* now includes 35 species.

The winter-rainfall zone of southern Africa is the center of *Moraea* both in species diversity and evolutionary depth. All five subgenera and over two-thirds of the species of the genus occur in this small portion of the African continent, extending from southwestern Namibia along the western and southern coast of South Africa to Port Elizabeth. This area of highly dissected landscape and a mosaic of different soils has very steep ecological gradients that expand the number of ecological niches available for plant species. This situation has promoted extraordinary radiation in a range of genera in many plant families there, including geophytic genera of Iridaceae like *Babiana* (ca. 75 species), *Geissorhiza* (over 80 species), *Gladiolus* (some 145 species), and of course *Moraea* (Goldblatt & Manning, 2000b). Many species of the southern African winter-rainfall zone have narrow ranges, and as might be expected of a flora of semi-arid to arid habitats, flowering is often dependent on the highly variable seasonal rainfall. The flowering of geophytes such as *Moraea* is also related to the fire cycle, an important factor in the vegetation of the region. One of the species described here, *M. cantharophila*, flowers well only after wild fires, and at some sites evidently only in the first spring season after fire. The other new *Moraea* described here is a narrow

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geographic endemic of dry valleys in the central southern Cape. Variable rainfall, narrow distributions, and erratic flowering make the documentation of the southern African geophyte flora difficult. It is not so surprising then, that new species of narrow distribution or of specialized habitat continue to be discovered in a part of the world that has enjoyed the attention of botanists for over 230 years since Linnaeus's student Carl Peter Thunberg collected there in the 1770s. We suspect that additional species, especially geophytes, will continue to be recognized as local exploration of the flora continues.

Exsiccatae are cited below following the quarter-degree square system in use in southern Africa as outlined by Edwards and Leistner (1971).

1. Moraea cantharophila Goldblatt & J. C. Manning, sp. nov. TYPE: South Africa. Western Cape: Sandy's Glen, loamy clay slope on farm Vredehoek, 16 Sep. 2000, *P. Goldblatt & J. C. Manning 11542* (holotype, NBG; isotypes, K, MO, PRE). Figure 1.

Plantae 20–45 cm altae, cormo globoso 15–20 mm diam. tunicis reticulatis fibrosis pallidis obtecto, folio unico producto lineari canaliculato 2.5–3.5 mm lato, caule erecto usitate ramoso, inflorescentiae spatha externa 35–45 mm longa, interna 45–65 mm longa, floribus albis vel cremeis tepalis externis prope basem limbi flavo- vel aurantiaco-notatis, tepalorum unguibus plerumque flavis ca. 10 mm longis, limbis patentibus, externis (15–)18–20 × 14–19 mm, internis 8–15 × 5–11 mm, filamentis 4–5 mm longis in columnam omnino connatis vel superne per 1 mm liberis, antheris purpureis ca. 6 mm longis, styli ramis 6–7 mm longis cristis 2.5–4 mm longis ornatis, ovario exserto 7–12 mm longo, capsula oblongoidea, 16–18 mm longa.

Plants 20–45 cm high. *Corm* globose, 15–20 mm diam., the tunics of coarse, pale straw-colored, netted fibers. *Cataphylls* papery, uppermost reaching shortly above the ground, becoming dry and dark brown by flowering time. *Foliage leaf* solitary, linear, channeled, arching outward, overtopping the stem and often dry toward the tip, mostly 2.5–3.5 mm wide, inserted on the stem at or close to ground level. *Stem* erect, straight or flexed at nodes, always arching outward below the inflorescence, usually with two aerial internodes, bearing an entirely sheathing bract-like leaf at the aerial node, this 4.5–5.5 cm long, green with a ± dry, attenuate apex, simple or with one, rarely two branches in the leaf axil and aerial node, the branches arching outward above the sheathing leaf. *Inflorescence* a rhipidium, terminal on the branches, mostly 2- or 3-flowered; *spathes* unequal, green, with dry attenuate apices, the outer 35–45 mm long, the inner 45–65 mm long. *Flowers* white or cream, the tepals

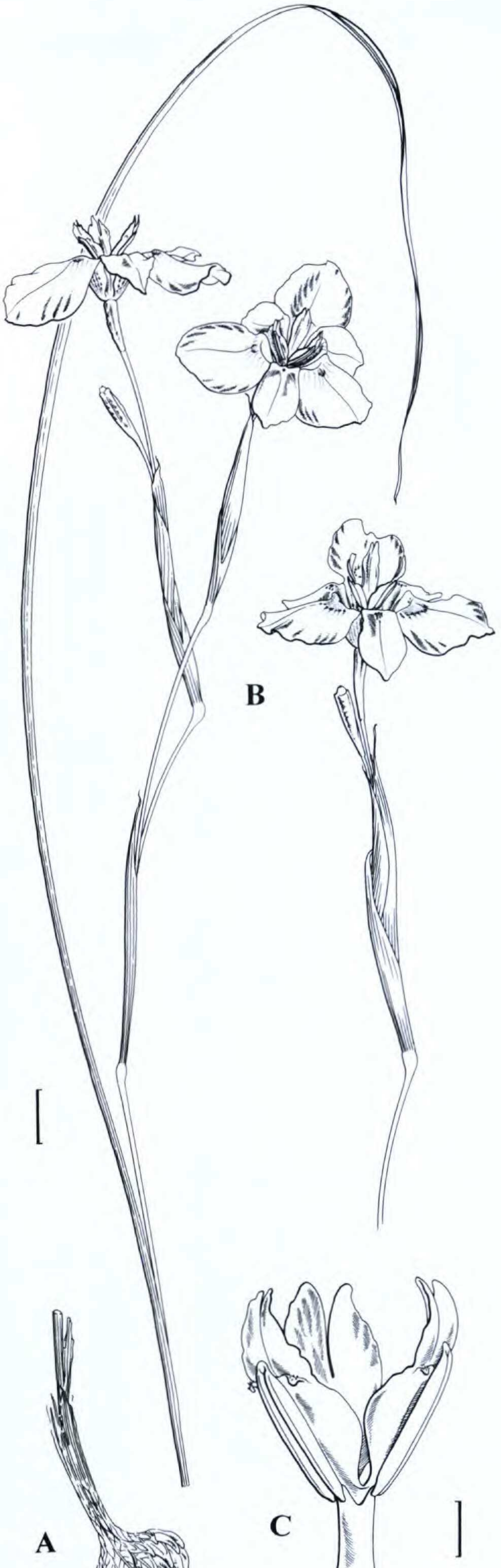

Figure 1. *Moraea cantharophila* Goldblatt & J. C. Manning (*Goldblatt & Manning 11580*). —A. Corm. —B. Flowering stem and leaf. —C. Detail of stamens and style branches. Scale bar 1 cm (A, B), 3 mm (C). Drawn by J. C. Manning.

darkly veined on the outside, the outer tepals each with a yellow or orange nectar guide outlined in dark purple at the limb base, the claw mostly yellow, the inner tepals each with a broad, dark purple-brown central band and pinkish edge, the tepal limbs spreading ± horizontally or the tips curving slightly upward, the claws ascending, forming a cup ca. 12 mm wide at the mouth, enclosing the filament column and anther bases; *tepals* clawed, the outer larger than the inner, the claws ca. 10 mm long, limb of the outer tepals obovate, (15–)18–20 × 14–19 mm, without a basal nectary, the claw smooth or papillate, limb of the inner tepals 8–15 × 5–11 mm. *Filaments* 4–5 mm long, united in a cylindric column or free in the upper 0.5–1 mm, smooth, greenish to dark purple; *anthers* ca. 6 mm long, oblong, diverging, appressed to the style branches, purple, the pollen orange. *Ovary* exserted, oblong-triquetrous, 7–12 mm long; *style* dividing at the apex of the filament column, yellow to salmon pink with a dark central band, the branches 6–7 × ca. 3 mm, ascending, the stigmatic flap bilobed, the crests triangular, uniformly salmon pink, ± erect, 2.5–4 mm long. *Capsules* ± oblong, 16–18 mm long; *seeds* unknown.

Flowering late August and September, rarely in early October; flowers lasting 3 days, the tepals arching upward and partially closing at night.

Etymology. From the Latin *cantharophila*, "beetle-loving," referring to the pollinators, hopliine scarab beetles, which visit the flowers and transfer pollen from one plant to another.

Distribution and habitat. Restricted to the southwestern Cape, *Moraea cantharophila* occurs on mountain slopes between the foot of Sir Lowry's Pass near Somerset West and Sandy's Glen in the Bredasdorp Mountains near Napier. It grows in loamy clay and not in the coarse sandy substrate that is more common in the Cape mountains.

Relationships. A member of subgenus *Vieusseuxia* (Goldblatt, 1976b, 1986), *M. cantharophila* has a single, long, channeled foliage leaf typical of the subgenus, a branched stem, but unlike the majority of the species the inner tepals are not tricuspidate, but are broadly lanceolate with an entire, acute apex. It is distinctive in the shape of the inner tepals, and it is one of the few species in the subgenus with entire inner tepals with a broad, well-developed limb. The filaments are united to the apex, also rare in the subgenus, in which most species have the upper 1–2 mm of the filaments free and diverging. The dark central streak on the inner tepals is distinctive and is directly related to the pollination biology. *Moraea cantharophila* is evidently most closely related to two other southwestern Cape species, *M. lurida* Ker Gawler and *M. insolens* Goldblatt, which also have entire inner tepals with a well-developed limb. Fly-pollinated *M. lurida* has flowers with a fetid, rotting scent and typically a darker-colored perianth, both the inner and outer tepals of which produce nectar over the entire inner surface of the claw, and the outer tepals do not usually have contrastingly colored markings. An important distinction between *M. lurida* and *M. cantharophila* is that the tepal claws of the former are relatively long, 13–17 mm, and slightly exceed the claw, compared to ca. 10 mm in *M. cantharophila*, this shorter than the limb. The tepal cup is thus deeper in *M. lurida* and includes both stamens and style branches. The anthers are partly exserted in *M. cantharophila*. *Moraea insolens* has rather different flowers with the short tepal claws spread almost horizontally, thus not forming a cup, and the anthers are ca. 8 mm long and exceed the short style crests less than 1 mm long (Goldblatt, 1976b). It is pollinated by hopliine beetles, as is *M. cantharophila*, and lacks nectaries, thus producing no nectar (Goldblatt et al., 1998; Goldblatt, unpublished data).

All three species occur in the same area, that is, from Sir Lowry's Pass eastward to Cape Agulhas, but *M. insolens* has the narrowest range, occurring along a band of loamy soil at the foot of the Caledon Swartberg. *Moraea lurida* occurs only on stony, sandstone-derived soils. These three species flower well after a wild fire the previous summer or autumn, and *M. cantharophila* and *M. lurida* flower poorly, if at all, until another fire. The known populations of *M. cantharophila* vary to some extent. The flowers of the Sir Lowry's Pass population lack floral odor entirely, and the inner tepals are white with a broad, dark median streak, like those of the Sandy's Glen plants, which have a broad, dark brown streak in the midline. The tepals of the Sir Lowry's Pass plants are smaller and 8–9 × 5–6 mm vs. 12–15 × 9–11 mm in the Sandy's Glen population.

Plants collected in the Elgin area east of Sir Lowry's Pass (*Goldblatt 11633, 11638*) appear to be an unusual form of *Moraea cantharophila* and may represent a form intermediate between this species and related *M. lurida*. Although they have white flowers with yellow inner tepals with a dark median streak or yellow inner and outer tepals, the inner tepals have short limbs mostly 3–4 × 5 mm, either entire or three-lobed with a short, acute central cusp. The flowers have an unpleasant, fetid odor, and the outer tepal claws are lightly papillate and produce a sweet exudate. Typical *M. canthar-*

ophila has entire inner tepal limbs 8–15 × 5–11 mm. The fetid odor and sweet exudate on the tepal claws are features of *M. lurida* (Goldblatt, 1986, and unpublished obs.), which has short inner tepal limbs that are occasionally trilobed. The possibility of hybridization between more typical *M. cantharophila* and *M. lurida* also occurred to us as an explanation for the strange floral morphology in the Elgin plants. No *M. lurida* was, however, found on sandstone slopes adjacent to the shale soils on which *M. cantharophila* grew.

Moraea cantharophila flowers have the features that are now associated with pollination by hopliine or monkey beetles (Scarabaeidae: Rutelinae: Hopliini): bright coloration, bold, contrasting markings, a salver- or bowl-shape, absence of floral odor (usually), and little or no nectar (Steiner, 1998; Goldblatt et al., 1998, 2000). Two species of hopliine beetles have been captured in the flowers, *Anisonyx* sp. and *Peritrichia pseudoplebia*, the insects typically found at rest with their body nested in the space between the tepal claws and style branches. All beetles captured carried heavy loads of *M. cantharophila* pollen on their bodies. Hopliines normally do little damage to flowers, although they consume some pollen, instead using the flowers as sites for assembly, competitive behavior, and copulation. At the type site, in Sandy's Glen in the Bredasdorp Mountains, *M. cantharophila* formed a guild with two other species with similarly colored and shaped flowers, *Drosera cistiflora* L. and *Aristea teretifolia* Goldblatt & J. C. Manning. Both species at this site have cream flowers with dark brown central markings and prominent anthers bearing bright yellow pollen. At the Sir Lowry's Pass site, *M. cantharophila* formed a guild with *Aristea cantharophila* Goldblatt & J. C. Manning, *Drosera cistiflora*, and *D. pauciflora* L. All four species were pollinated there by two other hopliine beetles, *Peritrichia pseudoplebia* and *Anisonyx ursus* (Goldblatt et al., 1998). Despite the fetid odor in the plants from Elgin, suggesting muscid fly pollination, we noted that these plants are, like other populations of *M. cantharophila*, also pollinated by hopliine beetles, in this case *Anisonyx hessei*. At one site, Die Hawe, we noted small bees visiting the flowers.

Paratypes. SOUTH AFRICA. **Western Cape:** 3418 (Simonstown) near the foot of Sir Lowry's Pass (BB), 28 Aug. 1995, *Goldblatt & Manning 10281* (K, MO, NBG); 3419 (Caledon) foot of Viljoen's Pass, clay ground (AA), 5 Sep. 1974, *Goldblatt 2491* (MO); slopes of the Groenland Mountains N of Elgin, 10 Oct. 2000, *Goldblatt 11633* (K, MO, NBG, PRE); Die Hawe, Elgin, 10 Oct. 2000, *Goldblatt 11638* (MO, NBG).

2. **Moraea lilacina** Goldblatt & J. C. Manning, sp. nov. TYPE: South Africa. Western Cape: northern foothills of the Langeberg, near Perdebont, Farm Graskloof, 23 Sep. 1979, *P. Goldblatt & I. Nänni 11587* (holotype, NBG; isotypes, K, MO). Figure 2.

Plantae 20–35 cm altae, cormo usitate globoso 12–16 mm diam. tunicis reticulatis fibrosis pallidis obtecto, folio unico producto lineari anguste canaliculato ca. 1.5 mm lato, caule erecto usitate eramoso, inflorescentiae spatha externa 25–30 mm longa, interna 40–45 mm longa, floribus perpallide roseis, tepalorum externorum 27–30 mm longorum abaxialiter lilacino suffusorum unguibus flavis ca. 10 mm longis ac limbis patentibus, internorum usque ad 18 mm longorum tricuspidatorum unguibus brunneis ca. 9 mm longis canaliculatis, filamentis 7–8 mm longis infra in columnam connatis superne liberis divergentibus, antheris albescentibus ca. 3.5 mm longis, styli ramis ca. 5 × 2 mm cristis 5–8 mm longis gracilibus ornatis, ovario exserto 7–8 mm longo, capsula ignota.

Plants 20–35 cm high. *Corm* globose or flattened by pressure, 12–16 mm diam., tunics of light brown, netted fibers. *Leaf* solitary, linear, narrowly channeled or the margins conduplicate, ca. 1.5 mm wide, trailing and often dry above. *Stem* erect, normally unbranched, with three aerial internodes, the nodes each bearing a sheathing, bract-like leaf 40–45 mm long, the apex attenuate and dry. *Inflorescence* mostly 2-flowered; *spathes* unequal, green, with dry attenuate apices, the outer 25–30 mm long, the inner 40–45 mm long. *Flowers* palest pink, flushed lilac-pink on the reverse of the outer tepals, fading darker pink, the outer tepals each with a bright yellow nectar guide at the base of the limb; *tepals* unequal, the outer larger, 27–30 mm long, the claw ascending, ca. 10 mm long, yellow, densely hairy, bearing a nectary at the base partly covered by a short flap of tissue ca. 1 mm long, the limb spreading at ca. 45° below horizontal, inner tepals to 18 mm long, tricuspidate, the claw ca. 9 mm long, brown, channeled, with a long, suberect central cusp ca. 9 mm long, and short, obtuse lateral lobes. *Filaments* 7–8 mm long, united in the lower two-thirds into a cylindrical column, smooth or papillate, free and diverging above; *anthers* appressed to the narrow style branches, ca. 3.5 mm long, reaching to within 1 mm of the stigma lobes. *Ovary* oblong, 7–8 mm long, exserted from the spathes; *style* dividing at the apex of the filament column, the branches diverging, ca. 5 × 2 mm, crests slender, erect, 5–8 mm long. *Capsules* and *seeds* unknown.

Flowering September.

Etymology. From the Latin *lilacina*, "lilac-colored," referring to the color of the tepals, flushed lilac below and darkening to lilac-pink with age.

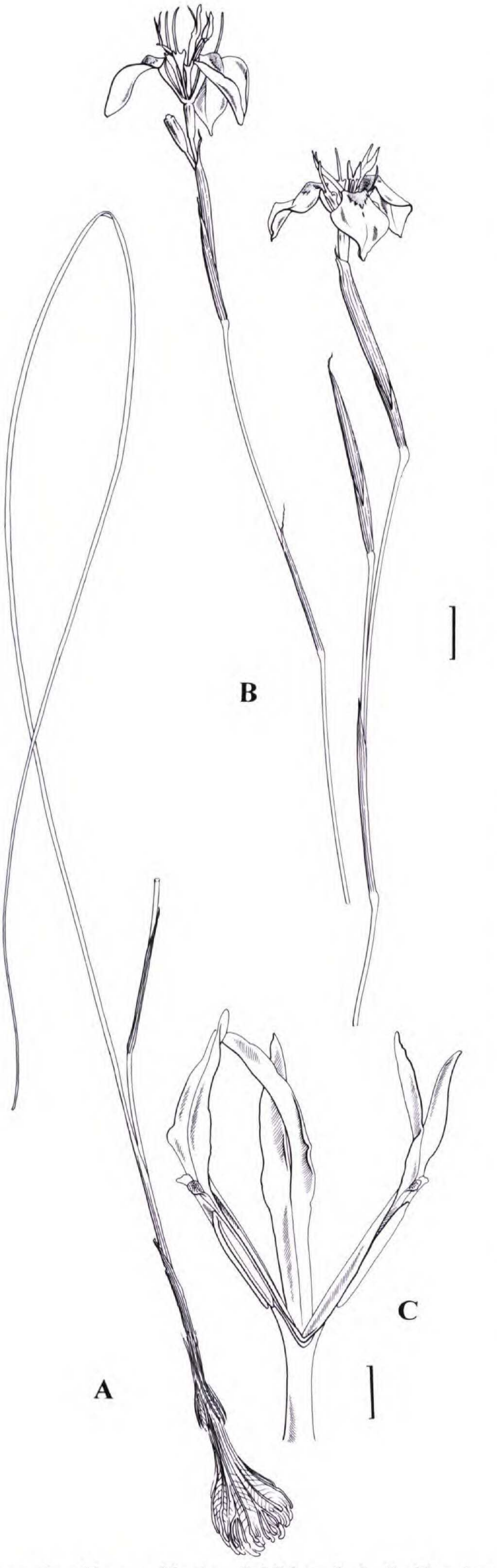

Figure 2. *Moraea lilacina* Goldblatt & J. C. Manning (*Goldblatt & Nänni 11587*). —A. Corm. —B. Flowering stem and leaf. —C. Detail of stamens and style branches. Scale bar 1 cm (A, B), 3 mm (C). Drawn by J. C. Manning.

Distribution and habitat. Restricted to the southern mountains of Western Cape Province, *Moraea lilacina* is known from the type site in the northern foothills of the Langeberg, northwest of Robinson's Pass. Plants grow in loamy soil mostly wedged in broken sandstone rock.

Relationships. *Moraea lilacina* is closely allied to the widespread southern African winter-rainfall *M. unguiculata* Ker Gawler, which is a remarkably variable species, both as regards perianth color and size. Important features of *M. unguiculata* are the inner tepals, which are 10–12 mm long and trilobed with the central cusp linear and coiled inward. The filaments are usually 3–5 mm long, with the column lightly to densely papillate, and the outer tepals are typically 12–20 mm long, exceptionally to 24 mm long in northern Namaqualand populations, with the limb (5–)8–12(–14) mm. The outer tepals may be white to cream, brown, violet, or even dull yellow and usually have a contrasting mark at the base of the limb. The style branches are narrow, spreading as in *M. lilacina*, but with erect crests 2–4(–5.5) mm long. Extending from Steinkopf in northern Namaqualand in the north to Humansdorp in the southeast, with isolated populations in the Karoo and Eastern Cape Mountains (Goldblatt, 1986; Goldblatt & Manning, 1995), *M. unguiculata* typically favors shale slopes and grows in renosterveld or transitional fynbos–renosterveld, but populations are known from sandstone slopes. *Moraea lilacina* favors a similar habitat. It can be recognized mainly by the large size of the flowers, which have inner tepals 16–18 mm long with an erect central cusp, filaments 7–8 mm long with a papillate or smooth column, and outer tepals 27–30 mm long. Most of the 16 plants we examined had unbranched stems, whereas individuals of *M. unguiculata* almost always have branched stems unless they are depauperate due to environmental stress.

Paratypes. SOUTH AFRICA. **Western Cape:** 3321 (Oudtshoorn) valley E of Perdebont, ridge SW of Beacon 90, S-facing slopes (DD), 16 Sep. 1998, *E. G. H. Oliver & I. Oliver 10874* (NBG).

TAXONOMIC NOTES

REDUCTION OF *MORAEA NEOPAVONIA* IN *M. TULBAGHENSIS*

Moraea tulbaghensis L. Bolus, S. African Gard. 22: 276. 1932. TYPE: South Africa. Western Cape: Saron, *H. M. L. Bolus s.n.* (holotype, BOL).

Moraea neopavonia R. Foster, Contr. Gray Herb. 165: 108. 1947. Syn. nov. *Iris pavonia* L. f., Suppl. Pl. 98.

1781. *Moraea pavonia* (L. f.) Ker Gawler, Konig & Sims, Ann. Bot. 1: 240. 1804, nom. illeg., non *M. pavonia* (L. f.) Thunberg, Diss. *Moraea*, 14. 1787 [= *Tigridia pavonia* (L. f.) DC.]. TYPE: South Africa. Western Cape: Swartland hills, *Thunberg s.n.* (lectotype, designated by Goldblatt (1976b), UPS, Herb Thunberg 1148A).

In the most recent account of *Moraea* in southern Africa (Goldblatt, 1986) *M. tulbaghensis* and *M. neopavonia* were regarded as closely allied species of subgenus *Vieusseuxia*. They shared with a small group of species within the subgenus, including the widespread *M. villosa* (Ker Gawler) Ker Gawler, a solitary foliage leaf hairy on the abaxial surface and a shortly hairy stem. Of these species, only the blue-flowered *M. gigandra* L. Bolus, *M. neopavonia*, and *M. tulbaghensis* have narrow style branches, as wide as or hardly wider than the anthers, and short style crests 1–2 mm long, which are overtopped by the anthers. Both *M. neopavonia* and *M. tulbaghensis* have orange (rarely to red) tepals and are distinguished in the key by the anthers exceeding the style crests by more than 1 mm (*M. neopavonia*) or by up to 1 mm (*M. tulbaghensis*). This distinction seemed useful in 1986 (Goldblatt, 1986) and was supported by the presence of brilliant green nectar guides on the outer tepals and anthers 7–10 mm long in *M. tulbaghensis* versus navy blue or speckled nectar guides and anthers 9–12 mm long in *M. neopavonia*. The type population of the latter species in the west of its range near Piketberg has boat-shaped, attenuate inner tepals, but other populations have tricuspidate inner tepals with a long, narrow central cusp, as does *M. tulbaghensis*.

New collections of both species have rendered this distinction untenable. Plants from Elandberg between Gouda and Hermon have flowers that seem to be most like those of *Moraea tulbaghensis*, but the deep orange to reddish outer tepals have navy blue nectar guides and anthers about 9 mm long exceeding the style crests by more than 1 mm. We no longer find it possible to distinguish the two species and therefore unite them under the earliest valid name, *M. tulbaghensis*. Available chromosome counts, for one population of each species, are $2n = 12$ (as *M. neopavonia*) and $2n = 24$ (as *M. tulbaghensis*) (Goldblatt, 1971a, 1976a). The basic chromosome number in *Moraea* subg. *Vieusseuxia* is $x = 6$. Thus in its revised circumscription *M. tulbaghensis* is heteroploid with both diploid and tetraploid populations. Related *M. villosa* also has diploid and tetraploid races, as do a handful of other species in the genus (Goldblatt, 1981).

NOTES ON *MORAEA SAXICOLA* GOLDBLATT

A species of Namaqualand, that is the coast and near interior of northwestern South Africa, *Moraea saxicola* (subg. *Moraea* sect. *Deserticola*) has a recorded range from Steinkopf in the north to near the town of Nuwerus in the south. Over this wide range its morphology is relatively uniform except that in the type population, from the Spektakel Mountains west of Springbok, plants have flowers with pale blue-mauve tepals and deep green leaves. Elsewhere flowers are almost white with the outside of the tepals faintly flushed with mauve or brown, and the leaf is gray-glaucous. Plants most closely resembling *M. saxicola*, collected in 2000 and 2001, some 50 to 70 km south of the known range, below the foot of Vanrhyns Pass near Vanrhynsdorp (*Goldblatt 11616*) and at the foot of the Kobee Mountains (*Goldblatt & Porter 11788*), are much smaller than all known populations of that species in all parts. They are mostly only 7–10 cm high and have a trailing to almost prostrate leaf with strongly undulate and crisped margins and a somewhat twisted blade. The small flowers are pale mauve with deep yellow nectar guides. Plants grow on the slopes of low hills in clay loam among quartzite pebbles, a common habitat in the area. The Vanrhyns Pass plants, collected in flower, have inflorescence spathes 25–30 mm long, and flowers with outer tepals 22–24 mm long, inner tepals ca. 18 mm long, filaments ca. 7 mm long, anthers ca. 3 mm long, and style crests 7–8 mm long.

The recorded variation for *Moraea saxicola* for these features is consistently larger: inflorescence spathes 30–60 mm long; outer tepals 30–40 mm long; inner tepals 25–30 mm long. Other floral parts similarly exceed those in this southern population, with filaments 7–13 mm, anthers 6–9 mm, style branches 8–15 mm, and crests mostly 10–15 mm long. Despite the size differences, the aspect of the plants is so consistent with *M. saxicola* that for the present we think this southern population is best regarded as an arid habitat ecotype of *M. saxicola* and should thus be included here, despite the argument that can be made for infraspecific recognition.

The vegetation where the southern populations of *Moraea saxicola* grow consists of a sparse cover of succulent shrubs, mostly Aizoaceae–Mesembryanthemoideae, and geophytes including *Moraea serpentina* Baker, *Babiana salteri* G. J. Lewis, and *B. sinuata* G. J. Lewis (Iridaceae), and *Ornithogalum polyphyllum* Jacquin (Hyacinthaceae). It is probably no coincidence that flowers of *M. serpentina* that are similar in size, coloring, and general morphology fade and deliquesce at about the time that those of *M. saxicola* open, at ca. 16:00H. Flowers of *M. serpentina* utilize the late morning and early afternoon for display and those of this population of *M. saxicola* the late afternoon. Presumably they share the same set of pollinators. In other populations of *M. saxicola* flowers have been recorded as opening after 13:00H and as late as 15:00H (Goldblatt, 1976b).

Additional specimens. SOUTH AFRICA. **Western Cape:** 31.118 (Vanrhynsdorp) foot of Kobee Pass, E of Vanrhynsdorp, in quartzite pebble areas (BD), Sep. 2000, *Goldblatt & Porter 11788* (MO, NBG); foot of Vanrhyns Pass (DB), Oct. 2000, *Goldblatt 11616* (K, MO, NBG, PRE).

MORAEA FLEXICAULIS, A NEW NAME FOR THE HOMONYM *M. FLEXUOSA* GOLDBLATT

Moraea flexicaulis Goldblatt, nom. nov. pro *M. flexuosa* Goldblatt, Ann. Missouri Bot. Gard. 69: 356. 1982, nom. illeg., non *M. flexuosa* L. f., Suppl. Pl. 100. 1781 (= *M. lewisiae* (Goldblatt) Goldblatt). TYPE: South Africa. Northern Cape: Richtersveld, Eksteenfontein road, *Goldblatt 6000A* (holotype, MO; isotypes, K, NBG, PRE, S, WAG).

The name *Moraea flexuosa* Goldblatt is a homonym for *M. flexuosa* L. f., an epithet in turn illegitimate (Goldblatt, 1971b) because it is superfluous for *M. longifolia* Jacquin, which dates from 1776. *Moraea flexuosa* L. f. is currently called *M. lewisiae* (Goldblatt) Goldblatt, and the epithet *lewisiae* was proposed for that species, then included in the genus *Hexaglottis,* because the combination *H. flexuosa* (L. f.) Sweet was, like the basionym, superfluous. Nevertheless, the name *M. flexuosa* L. f. is valid, and prevents the subsequent use of the epithet in *Moraea.* The new name *M. flexicaulis* is proposed here for the later homonym.

We also report a range extension for this rare species of the southern Richtersveld in Namaqualand. The species was described from the Anenous flats on the farm Grasvlakte in 1982. During fieldwork in the Richtersveld in September 2000, we found plants at the type locality and some 20 km to the north in stony ground at the foot of low hills adjacent to the road to Eksteenfontein (*Goldblatt, Manning & Savolainen 11494,* 11 Sep. 2000, NBG). Plants were in fruit, but the distinctive vegetative morphology makes it all but certain that they represent *M. flexicaulis.*

RANGE EXTENSIONS FOR *MORAEA RIVULICOLA* AND AN EMENDED CIRCUMSCRIPTION

Described in 1995, *Moraea rivulicola* Goldblatt & J. C. Manning (*Moraea* subg. *Vieusseuxia*) was then known from northern Namaqualand in seasonal watercourses at Spektakel Pass, near Springbok, and in the Kamiesberg (Goldblatt & Manning, 1995). Plants were distinguished from the nearly sympatric *M. unguiculata* by the larger flowers with outer tepals 20–24 mm long with claws 7–10 mm long and limbs 14 × 10 mm, and the inner tepals 13–15 mm long. The filaments are ca. 8 mm long with the column ca. 5.5 mm long, and the anthers are 4–5 mm long.

Plants from the Richtersveld near Kosies accord with the description and represent a range extension to the north. A population from the rocky hills west of Bitterfontein and south of Kotzesrus collected in 2001, however, differs in their substantially larger flowers with bright yellow-green tepals and strong foetid odor, a feature not reported in other populations. These plants have outer tepals ca. 28 mm long with the claw up to 14 mm and the limb 14 × ca. 10 mm, while the inner tepals are ca. 19 mm long and not trilobed but have an ovate-attenuate limb. Other organs are also larger, with the filament column ca. 10 mm long and free for an additional 2.5 mm, while the anthers are 5.5–6 mm long and the style crests about 5 mm long. The inner rhipidial spathes are 6–9 cm long, contrasting with 5.5–6.7 cm long in other populations. Plants of the Kotzesrus population share with more typical *M. rivulicola* the smooth tepal claws and elongate ovary, 11–14 mm long. The habitat was not, as in other populations, in a watercourse, but along a dry gully, where water presumably accumulates in periods of precipitation. While the taxonomic status of this population remains to be determined, there is no doubt that it represents a significant variant and thus a distinctive race, perhaps deserving of subspecific recognition.

Additional specimens. SOUTH AFRICA. **Northern Cape:** 29.17 (Springbok) Richtersveld, base of Kosies (BA), 26 Sep. 1987, *Williamson 3751* (NBG); 30.17 (Hondeklipbaai) W of Bitterfontein, 19 km S of Kotzesrus on the road to Landplaas, edge of granite escarpment (DD), 16 Sep. 2001, *Goldblatt & Porter 11892* (K, MO, NBG, PRE).

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